

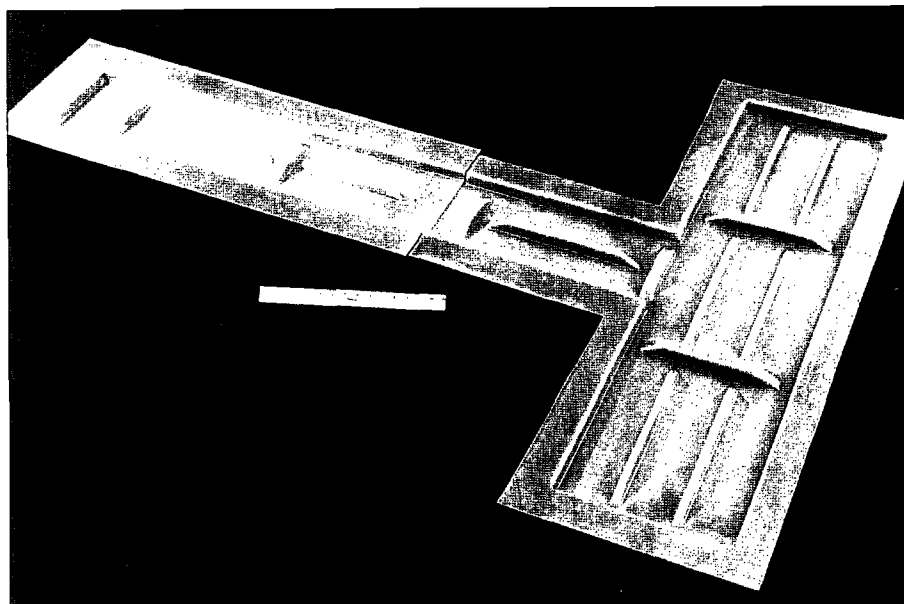
Materials for Lightweight Vehicles Program – helping develop lighter, more fuel efficient, safer cars

Extensive use of a wide range of lightweight/high strength materials in the manufacture of gasoline-powered automobiles could lead to cars that provide 50-70% better fuel efficiency yet are comparable in size, comfort and safety to today's family vehicles. These reduced-weight vehicles could reduce our demand for imported oil by more than one million barrels *per day* by the year 2010.

In addition to substantially improving the fuel economy of "conventional" vehicles, these materials are critical to the successful market competitiveness of zero-emission electric vehicles (EVs), as they will enable designers to achieve the range and responsiveness required to make EVs acceptable to the American consumer.

Currently, materials such as polymer and metal matrix composites, ordered intermetallics and aluminum alloys are used primarily in aerospace applications, and are not yet cost-effective for use in the competitive automotive market. Much of the high cost of these materials technologies can be attributed to materials costs, process and manufacturing procedures, and costs associated with the inability to design with new materials, especially with regard to composite materials.

The objective of this new Program, initiated in 1993, is to work in cooperation with U.S. automakers and their materials suppliers to develop the materials technology that will allow greater use of lightweighting materials in the manufacture of lighter, fuel efficient and safe fam-



Complex single sheet aluminum component formed by advanced manufacturing process

ily vehicles. Efforts focus on synthesis, processing and advanced materials forming and manufacturing techniques, development of which can help make lightweight materials cost competitive with conventional sheet steel.

Development of these technologies can lead to more energy efficient vehicles, decreasing reliance on foreign petroleum and reducing adverse environmental impacts. It can also improve the international competitiveness of the U.S. auto industry, helping to preserve jobs for American workers.

Building on DOE materials knowledge

Many high-tech lightweight materials, such as carbon fiber-reinforced polymer matrix composites, already exist, but the knowledge to *cost-competitively* design and manufacture automotive systems and components from these materials does not. Now, the technology must be developed that will

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lower costs to levels that allow industry to competitively manufacture automobiles from these materials.

Focus on new and better ways to work

The Program will support process integration R&D activities, including the development of:

- Lower cost processing and manufacturing techniques
- Alternative synthesis and processing routes
- Methods to interface advanced materials with conventional materials
- Easier-to-manufacture composite matrices
- New software design tools
- New computational analysis techniques for materials synthesis and safety testing
- Technologies for effectively recycling lightweight materials

Strong linkages with industry and other areas of government

This Program supports collaborative R&D efforts with the auto industry and its suppliers; the DOE Office of Transportation Materials has already established strong linkages with these industrial groups. The need for R&D to lower the cost of advanced lightweight materials for ground transportation has been established through interactions with representatives of the industry through their trade association, the American Automobile

Manufacturers Association (AAMA), and the concept of a government/industry cost-shared program has received strong industry support. A five-year R&D Program Plan has been developed as a result of these industrial interactions.

Linkages have also been established with the Automotive Composites Consortium (ACC) and the U.S. Automotive Materials Partnership (USAMP) which operates as one of 13 consortia under the umbrella organization, U.S. Council for Automotive Research (USCAR). In addition, aerospace companies such as Boeing and GE, which make extensive use of these materials for aerospace applications, are involved.

Other federal agencies are involved in the Program through the Committee on Materials (COMAT) out of the White House Office of Science and Technology Policy (OSTP). These include the National Institute of Standards and Technology (NIST), participating through a formal interagency agreement, U.S. Department of the Interior/Bureau of Mines, DOD/ARPA and NASA.

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